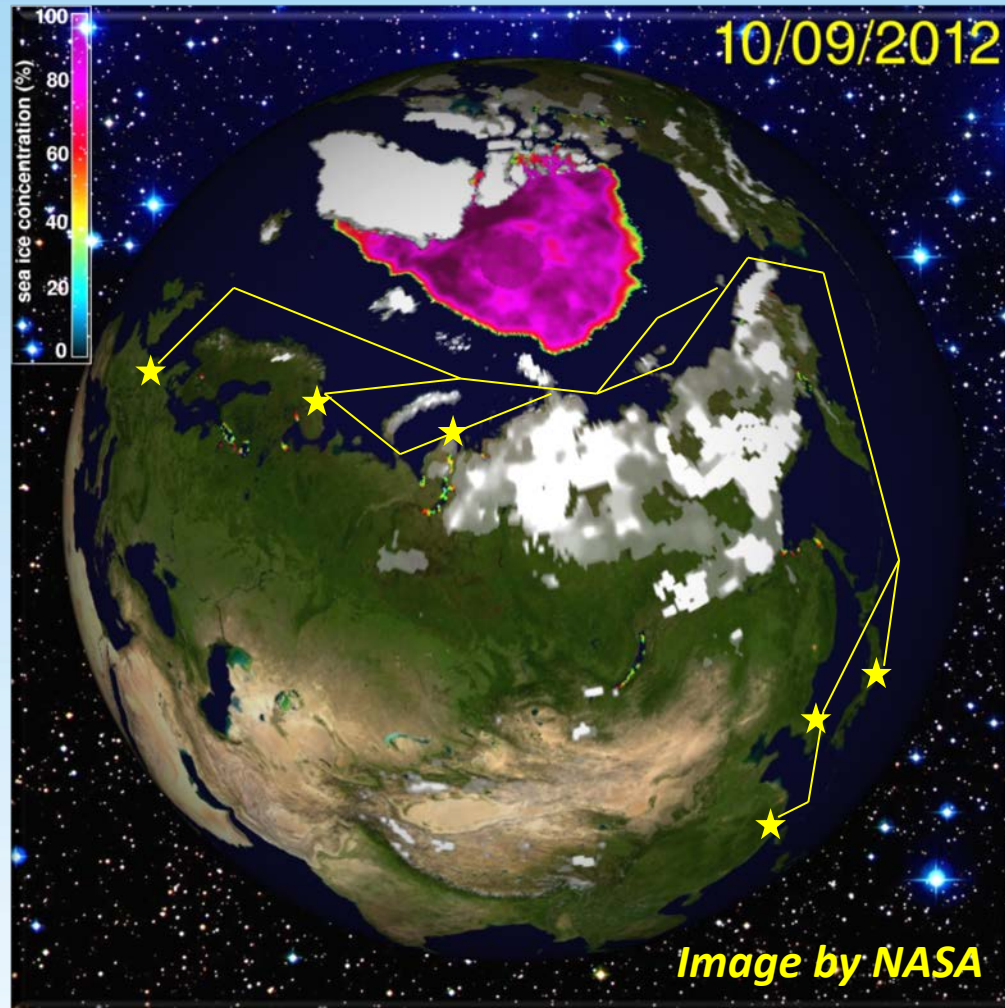


# ROSATOMFLOT



**The Navigation on the Northern Sea Route  
Today & in the Future**

# Northern Sea Route is the highway to European and Asian markets

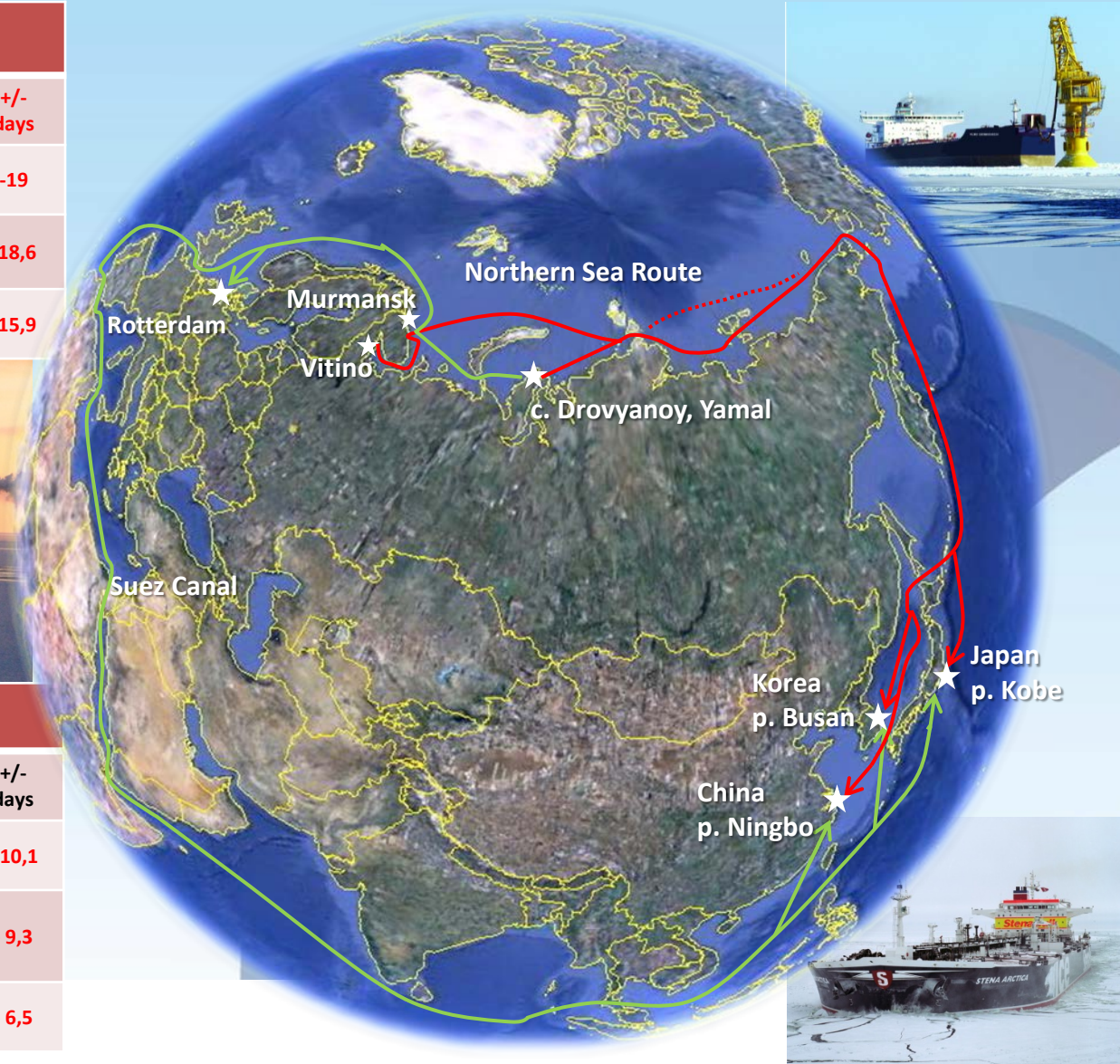
## Oil and Gas from Murmansk

State	through Suez Canal		through NSR		+/- days
Japan (p. Kobe)	12291 miles	37,1 days	6010 miles	18,1 days	-19
Korea (p. Busan)	12266 miles	37 days	6097 miles	18,4 days	-18,6
China (p. Ningbo)	11848 miles	35,8 days	6577 miles	19,9 days	-15,9



## From Rotterdam to the Asian markets

State	through Suez Canal		through NSR		+/- days
Japan (p. Kobe)	10969 miles	33,1 days	7610 miles	23 days	-10,1
Korea (p. Busan)	10754 miles	32,5 days	7697 miles	23,2 days	-9,3
China (p. Ningbo)	10336 miles	31,2 days	8177 miles	24,7 days	-6,5



**First Commercial Transit Voyage of a non-Russian flag vessel via  
the Northern Sea Route  
mv Beluga Fraternity & mv Beluga Foresight in 2009  
Saved more than 3000 miles and 10 days compared to the Suez Canal**



1. 29.08.2009 – left p. Masan, Republic of Korea
2. 31.08.2009 – meeting with ib 50 Let Pobedy
3. 03.09.2009 – ib Rossia joined the convoy
4. 07-11.2009 – offshore discharging in Noviy Port / port of Yamburg
5. 16.09.2009 – exit from the NSR in the West

# Transit Voyages 2010



## SCF Baltica:

**NSR period: 16.08 – 27.08.2010**

**(10,5 days)**

**Tanker deadweight: 117000 tons**

**Cargo: 70000 tons of gas condensate**



## Nordic Barents:

**NSR period: 8 days**

**Bulker deadweight: 43372 tons**

**Cargo: 41000 tons of iron concentrate**

**4 transit voyages were done in 2010**  
**Total amount of transit cargo: 111 000 tons**  
**In ballast: 2 voyages**

# The Latest Transit via NSR

## December 16-25, 2010



The voyage by Swedish supply icebreaker Tor Viking II piloted by atomic icebreaker Rossiya was done a month after the official completion of summer-to-autumn navigation on the NSR. This successful transit voyage done in late December proved that it is possible to increase the period of Arctic navigation on the NSR in winter months.

# Pilotage of mt Perseverance on the NSR in 2011



## Eastbound Voyage:

**Tanker deadweight: 75000 tons**

**Cargo: 61000 tons gas condensate**

**NSR navigation period: 30.06 – 15.07.2011**

**(14,9 days)**

**Average speed: 7,6 knots**

## Return Voyage:

**Tanker deadweight: 75000 tons**

**Cargo: 64000 tons jet fuel**

**NSR navigation period: 09.09 – 16.09.2011**

**(8 days)**

**Average speed: 13,7 knots**

# Pilotage of mt Vladimir Tikhonov on the NSR

## The Largest Vessel that Transited NSR



**Tanker deadweight: 160 000 tons (Suezmax)**

**Cargo: 120 000 tons gas condensate of JSC NOVATEK**

**NSR navigation period: 23.08 – 30.08.2011**

**Average speed: 14,0 knots**

# Pilotage of mv Sanko Odyssey on the NSR

## The First Panamax Bulk Carrier that Transited NSR



**Bulker deadweight: 75 000 tons (Panamax)**

**Cargo: 66 500 tons of iron ore by JSC EUROCHEM**

**NSR navigation period: 03.09.2011 – 10.09.2011**

**Average speed: - 13,7 knots**



# NSR Caravan Piloting July 2012



**Mv Nordic Odyssey, ttb Vengeri, mt Marilee, mv Kapitan Danilkin  
ice-piloted by ib Yamal and Vaygach July 12 – 22, 2012**

# **NSR Caravan Piloting July 2012 Westbound**



**mt Stena Poseidon, mv Nordic Orion, i/b Xuelong, mv Kapitan Danilkin  
ice-piloted by ib Vaygach July 22 – 30, 2012**

# LNG Ob River in Transit via NSR

**LNG Ob River**

**Ice Class 1A (Arc 4)**

**Displacement 116 325 t**

**Cargo Capacity: 149 755 cmb**

**Flag: Marshall Islands**



**Ballast:**

**Westbound 08-16.10.2012**

**Laden:**

**Eastbound 09-18.11.2012**

**134 738 cbm LNG**

# Total of Transit Voyages in 2010-2013

	2010	2011	2012	2013*
Total Volume of Transit Cargo, t	<b>111 000</b>	<b>820 789</b>	<b>1 261 545</b>	<b>1 261 809*</b>
Total Number of Transit Voyages	<b>4</b> (2 of them in ballast)	<b>34</b> (10 of them in ballast)	<b>46</b> (13 of them in ballast)	<b>52*</b> (17 of them in ballast)

## NSR Transit 2012 Cargo

Cargo Type	Number of Vessels	Volume, t	Displacement, t	Cargo Volume Eastbound, t	Cargo Volume Westbound
Liquid	26	894 079		661 326	232 753
Bulk	6	359 201		262 263	96 938
Frozen Fish	1	8 265			8 265
Ballast	6		472 075		
Repositioning	7		78 351		
<b>Total:</b>	<b>46</b>	<b>1 261 545</b>	<b>550 426</b>	<b>923 589</b>	<b>337 956</b>



\* As per October 14, 2013

# The Gulf of Finland



**2011**

**i/b Vaygach**

**Freight period: 19.02 – 16.04.2011**

**Total vessels piloted: 258**

**2012**

**i/b 50 Let Pobedy 27.01 – 09.03.2012**

**i/b Rossiya 09.03 – 18.04.2012**

**Total vessels piloted: 332**

**2013**

**i/b Rossiya**

**Frigh period 16.01 – 15.04.2013**

**Total vessels piloted: 355**

# White Sea (Vitino Port Operations)



# I. Cargo base for the Northern Sea Route



West-East	East-West
<p>LNG(p. Sabetta, Hammerfest)                      Iron Ore (Murmansk, Narvik)                      Crude Oil (Primorsk)                      Gas condensate (Ust-Luga, p. Vitino)</p>	<p>Coal (Prince Rupert, Vancouver)                      Fish (Petropavlovsk-Kamchatsky, Hokkaido)                      Light oil products (Busan, Incheon)                      Seasonal container cargoes (Busan, Hokkaido)</p>
<p><b>Total: 15 mln. transit tons per year + 15 mln. LNG from p. Sabetta + 10 mln. tons of oil from Noviy Port</b></p>	

# Yamal LNG Port Sabetta Construction Site

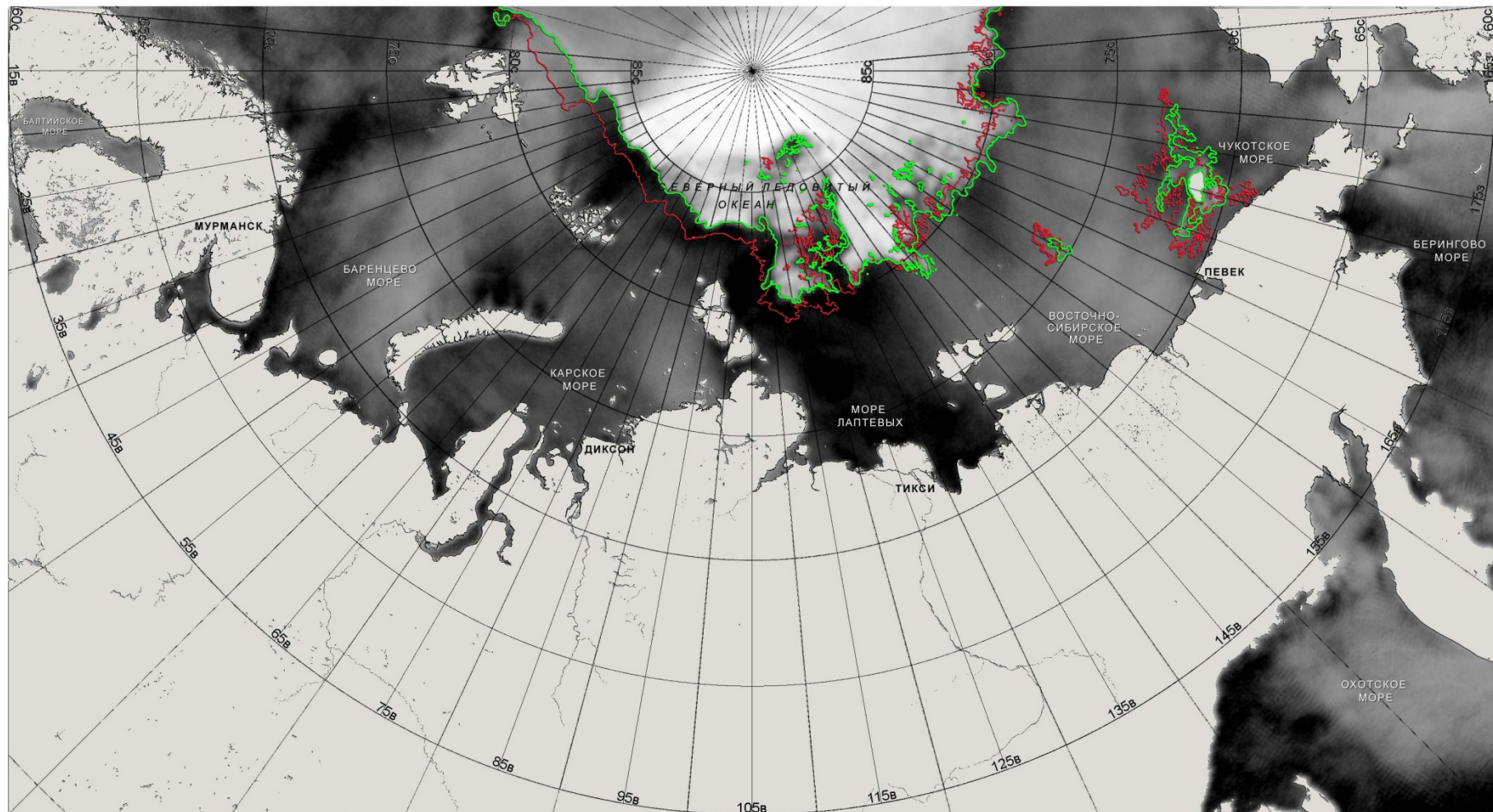




# II. Ice Conditions in the Russian Arctic

Satellite Image of Ice Conditions in the Russian sector of Arctic dd. 18.09.2012

ФЕДЕРАЛЬНАЯ СЛУЖБА ПО ГИДРОМЕТЕОРОЛОГИИ И МОНИТОРИНГУ ОКРУЖАЮЩЕЙ СРЕДЫ  
ФГБУ "НАУЧНО-ИССЛЕДОВАТЕЛЬСКИЙ ЦЕНТР КОСМИЧЕСКОЙ ГИДРОМЕТЕОРОЛОГИИ "ПЛАНЕТА"



Радиолокационное изображение ледовой обстановки в российском секторе Арктики

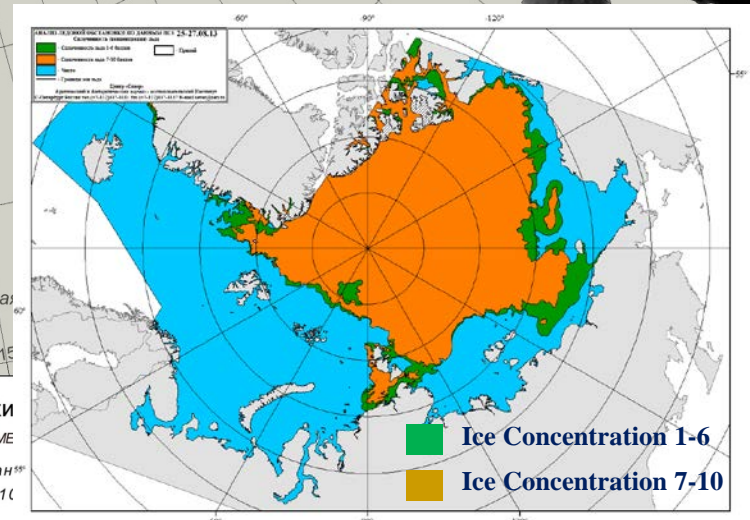
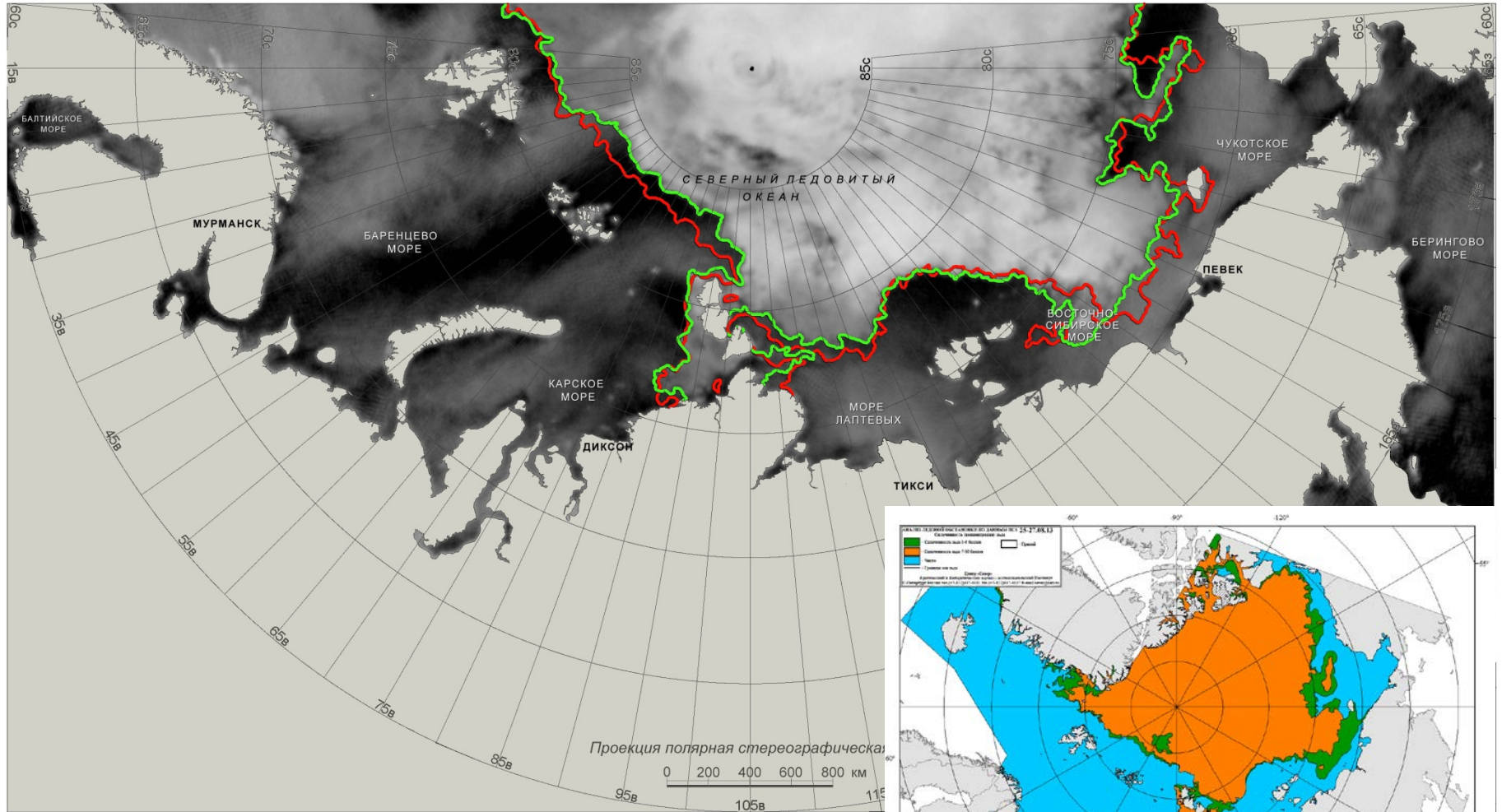
Составлена по данным ИСЗ OceanSat-2/OSCAT, AQUA/MODIS, NOAA/AVHRR, DMSP/SSM/I © EUMETSAT OSI SAF, © NOAA-NESDIS-STAR, 17.09 - 18.09 2012

- положение кромки дрейфующего льда (сплоченностью 1-10 баллов) на 17.09 - 18.09.2012
- положение кромки дрейфующего льда (сплоченностью 1-10 баллов) на 09.09 - 11.09.2012

# Ice Conditions in the Russian Arctic

Satellite Image of Ice Conditions in the Russian sector of Arctic dd. 27.08.2013

ФЕДЕРАЛЬНАЯ СЛУЖБА ПО ГИДРОМЕТЕОРОЛОГИИ И МОНИТОРИНГУ ОКРУЖАЮЩЕЙ СРЕДЫ  
ФГБУ "НАУЧНО-ИССЛЕДОВАТЕЛЬСКИЙ ЦЕНТР КОСМИЧЕСКОЙ ГИДРОМЕТЕОРОЛОГИИ "ПЛАНЕТА"



**Радиолокационное изображение ледовой обстановки**  
Составлено по данным ИСЗ Oceansat -2/OASCAT, MetOP/ASCAT, AQUA/MODIS, NOAA/AVHRR, © EUMETSAT  
— положение кромки дрейфующего льда "осеннего образования"  
— положение кромки дрейфующего льда (сплоченностью 1-10)

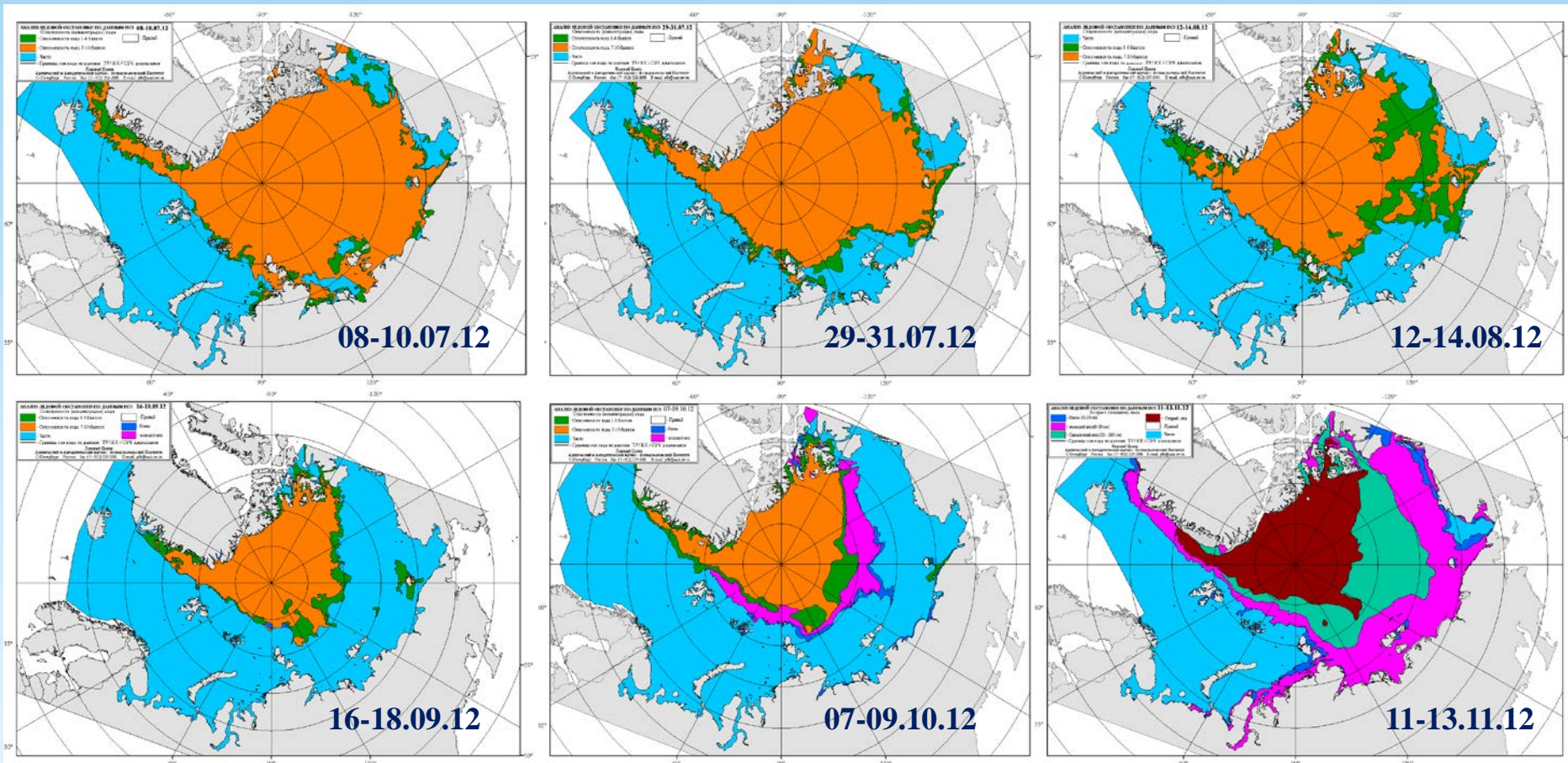
ФГБУ "НИЦ "ПЛАНЕТА"  
Россия, 123342 Москва  
Б. Предтеченский пер., 7  
Тел: (499) 252 37 17  
Факс: (499) 252 66 10  
E-mail: [asmus@planet.itp.ru](mailto:asmus@planet.itp.ru)







# Permitted Ice Class for NSR Navigation for July – November period

Ice Class	Permitted Navigation	Kara Sea						Laptev Sea						East Siberian Sea						Chukchi Sea		
		South-West Area			North-East Area			Western Area			Eastern Area			South-West Area			North-East Area					
		H	M	L	H	M	L	H	M	L	H	M	L	H	M	L	H	M	L	H	M	L
No Ice Class	in	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red
	IB	Red	Red	Green	Red	Red	Green	Red	Red	Green	Red	Red	Green	Red	Red	Green	Red	Red	Green	Red	Red	Green
Ice1 (1D)	in	Red	Red	Green	Red	Red	Green	Red	Red	Green	Red	Red	Green	Red	Red	Green	Red	Red	Green	Red	Red	Green
	IB	Red	Red	Green	Red	Red	Green	Red	Red	Green	Red	Red	Green	Red	Red	Green	Red	Red	Green	Red	Red	Green
Ice2 (1C)	in	Red	Red	Green	Red	Red	Green	Red	Red	Green	Red	Red	Green	Red	Red	Green	Red	Red	Green	Red	Red	Green
	IB	Red	Green	Green	Red	Green	Green	Red	Green	Green	Red	Green	Green	Red	Green	Green	Red	Green	Green	Red	Green	Green
Ice3 (1B)	in	Red	Red	Green	Red	Red	Green	Red	Red	Green	Red	Red	Green	Red	Red	Green	Red	Red	Green	Red	Red	Green
	IB	Green	Green	Green	Green	Green	Green	Red	Green	Green	Red	Green	Green	Red	Green	Green	Red	Green	Green	Red	Green	Green
Arc4 (1A)	in	Red	Green	Green	Red	Green	Green	Red	Green	Green	Red	Green	Green	Red	Green	Green	Red	Green	Green	Red	Green	Green
	IB	Green	Green	Green	Green	Green	Green	Red	Green	Green	Red	Green	Green	Red	Green	Green	Red	Green	Green	Red	Green	Green
Arc5 (1A Super)	in	Green	Green	Green	Green	Green	Green	Red	Green	Green	Red	Green	Green	Red	Green	Green	Red	Green	Green	Red	Green	Green
	IB	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Arc6	in	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
	IB	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Arc7	in	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
	IB	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Arc8	in	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
	IB	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Arc9	in	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
	IB	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green

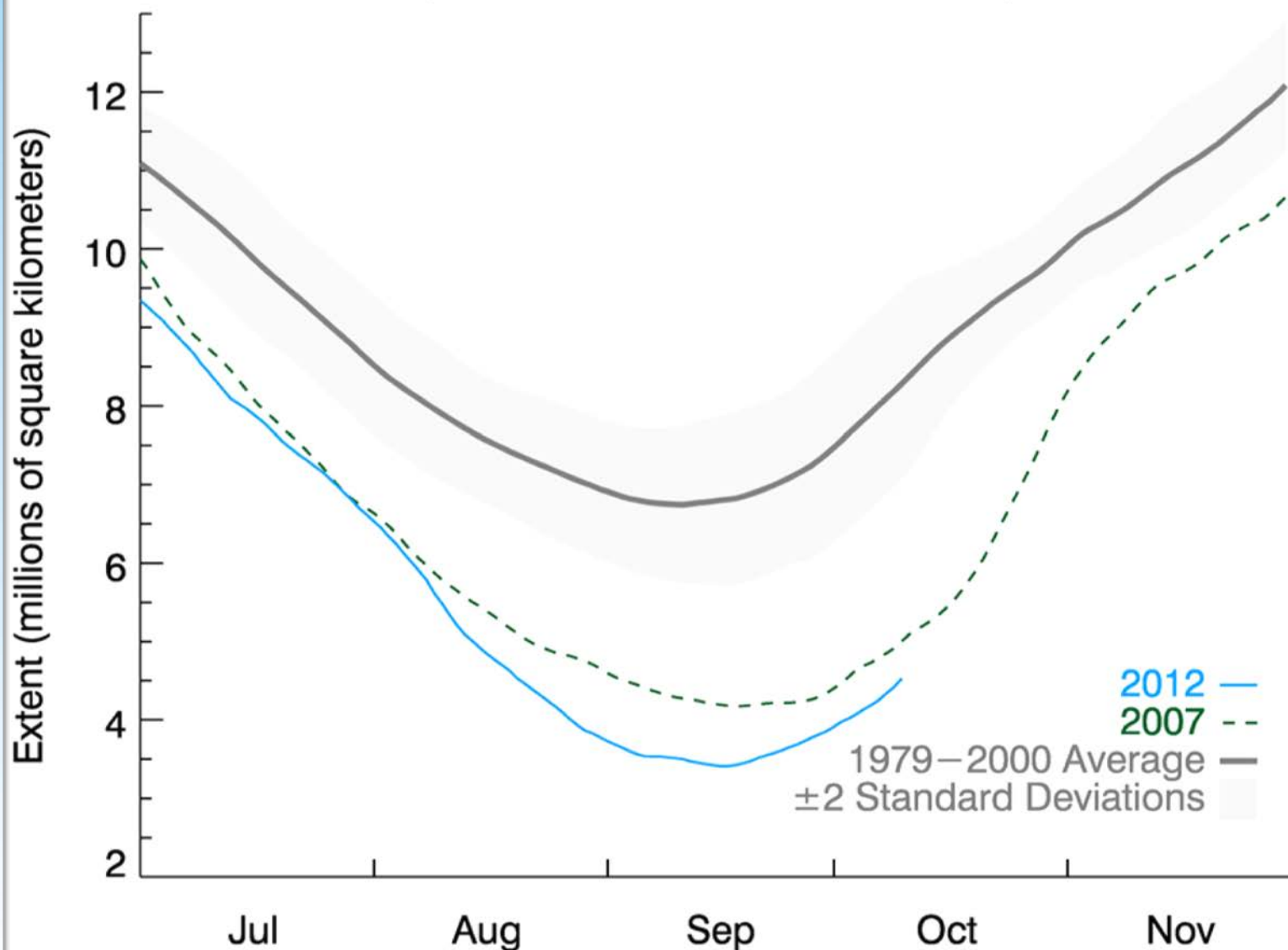
in – independent navigation, IB – navigation with icebreaking support, H – heavy, M – medium, L – light ice conditions

# Ice Conditions by Periods:



	Ice Concentration 1-6 points		Ice Concentration 7-10 points
	Extra Young Ice		Fast Ice
	Young Ice (0-30 cm)		Clear
	One-Year Ice (30-200 cm)		
	Ice Area Border according to TV/IR/microwave		

### Arctic Sea Ice Extent (Area of ocean with at least 15% sea ice)



National Snow and Ice Data Center, Boulder CO

### III. Atomic Icebreaking Fleet and Further Development



# Atomic Icebreaking Fleet of Russia



## Atomic icebreakers of “Arktika” type:

Propulsion Capacity – 54 MW;

Water displacement – 23000 t;

i/b “Rossia” – **21.12.1985**

i/b “Sovetsky Soyuz” – **29.12.1989**

i/b “Yamal” – **28.10.1992**

i/b “50 Let Pobedy” – **23.03.2007**



## Atomic Icebreakers of “Taimyr” type:

Propulsion Capacity – 35 MW;

Water displacement 21000 t;

i/b “Taimyr” – **30.06.1989**

i/b “Yaygach” – **25.07.1990**

# Federal State Unitary Enterprise of Atomic Fleet



## Atomic Fleet has 18 units:

**Personnel: 1234**

- Atomic Vessels - 10
  - Atomic Icebreakers – 9
    - Among them operational - 5
  - Atomic container carrier - 1
- Special Vessels – 5
- Floating Port Crane
- 2 Floating Docks

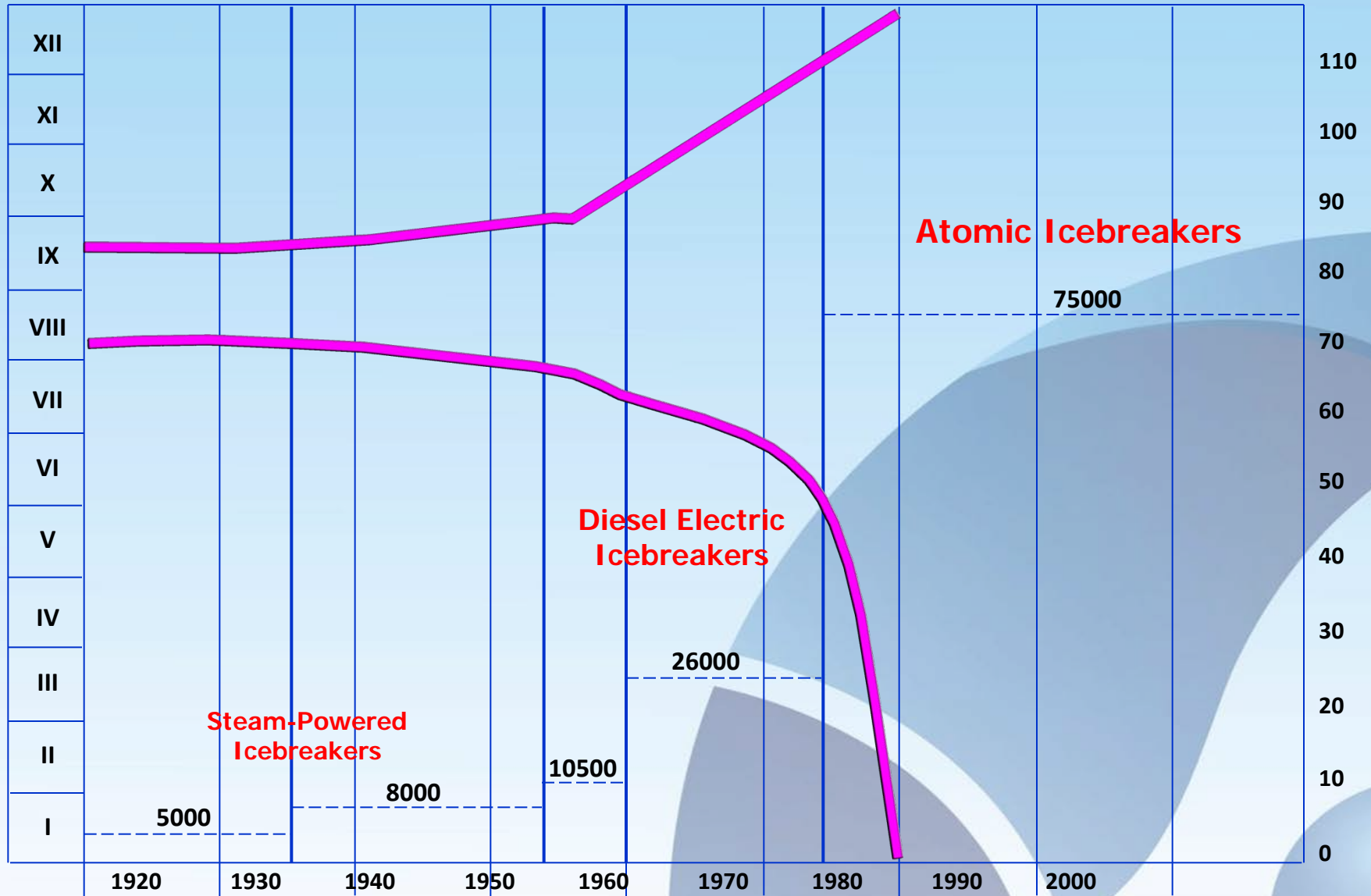
## Coastal Facilities:

**Personnel: 825**

- base for the atomic icebreaking fleet;
- full complex of ship repair;
- nuclear fuel handling;
- radioactive wastes handling.



# Increase in navigation period in the western area of Russian Arctic in 1920-2009 related to rise of icebreaking capacity



# 100 Icebreakers on the North Pole 1977 - 2013

1977 1987 год 1990 91 92 93 94 95 96 97 98 99 2000 01 02 03 04 05 06 07 08 09 2010 11 12 13

# 100

ледоколов

- 85 Россия
- 3 Германия
- 8 Швеция
- 1 Канада
- 3 США

## на Северном полюсе



а/л «Арктика» — первый ледокол на Северном Полюсе. 17 августа 1977г.

81

Атомоходы класса «Арктика»:

14

Дизель-электрические ледоколы под проводкой ледокола класса «Арктика»

Дизель-электрические ледоколы в самостоятельном плавании

2 рейса



АРКТИКА



СИБИРЬ



РОССИЯ



СОВЕТСКИЙ СОЮЗ



ЯМАЛ



50 лет ПОБЕДЫ

20-й рейс а/л «50 лет Победы» был дважды юбилейным.

### 30 июля 2013

в сотый раз на Северный Полюс пришел ледокол. Точно по расписанию рейса.



50 ЛЕТ ПОБЕДЫ




## ледокол №1

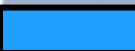

- 1864** На небольшом пароходе улица Михаила Бритнева была срезана носовая оконечность по образцу морских лодок, в результате чего судно могло наползать на лед и ломать его своей тяжестью. Впоследствии пароход «Пайлота» привели прообразом нового типа судов — ледоколов.
- 1899** По проекту адмирала С.О. Макарова построено первое в мире специализированное судно для прокладывания пути во льдах — ледокол «Ермак». После 60 лет работы, по решению Министерства морского флота СССР «ледушка ледокольного флота» был сожжен на рейде как «... не представляющий исторической ценности»
- 1959** В СССР построено первое в мире атомное судно с ядерной силовой установкой — атомный ледокол «Ленин».
- 1975** Построен первый в истории корабль, способный ходить в Северном Ледовитом океане куда и когда угодно. Головной в серии из шести атомоходов — атомный ледокол «Арктика»
- 2007** На «Балтийском заводе» (Санкт-Петербург) построен самый большой и мощный ледокол в мире, последний из серии атомоходов класса «Арктика» - атомный ледокол «50 лет Победы».



# Med-term Operational Period of Atomic Icebreakers (with Nuclear Power Plant resource of 150-175 000 hours)

Наименование	Год ввода в эксплуатацию	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Taimyr	1989	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow									
Vaygach	1990	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow								
Rossiya	1985	Dark Blue	Dark Blue														
Sovetskiy Soyuz	1989	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Light Blue	Light Blue	Light Blue	Light Blue		
Yamal	1992	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Light Blue	Light Blue	Light Blue	Light Blue			
50 Let Pobedy	2007	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue
<b>Commission of Universal Atomic Icebreakers (IB-60 type)</b>																	
1 <sup>st</sup> IB-60	2017							Light Green	Light Green	Light Green	Light Green	Light Green	Light Green	Light Green	Light Green	Light Green	Light Green
2 <sup>nd</sup> IB-60	2019									Light Green	Light Green	Light Green	Light Green	Light Green	Light Green	Light Green	Light Green
3 <sup>rd</sup> IB-60	2021											Light Green	Light Green	Light Green	Light Green	Light Green	Light Green

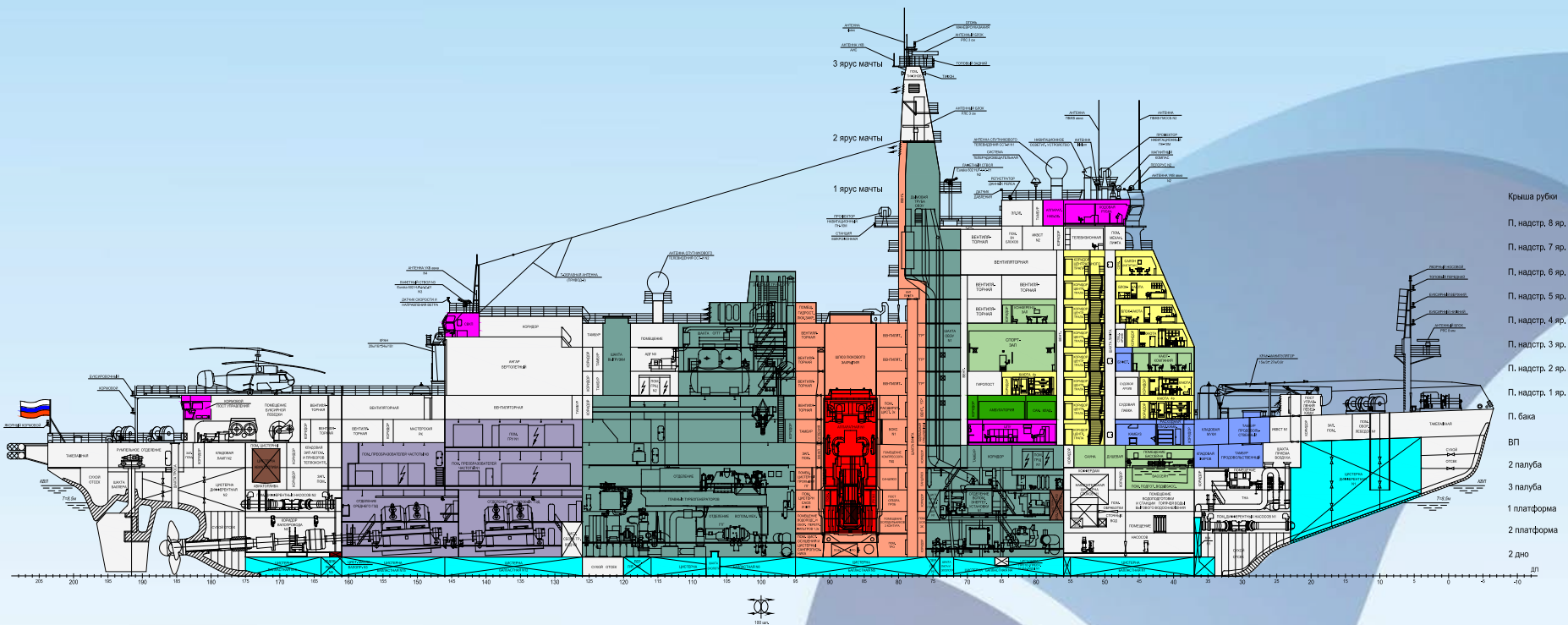
-  - Linear icebreakers operational period
-  - Low-draught icebreakers operational period
-  - New universal icebreakers operational period

-  - If prolonged up to 175 000 hours
-  - If prolonged up to 175 000 hours

# Universal Atomic Icebreaker



# Universal Atomic Icebreaker. General Scheme. Longitudinal Section.



<b>Principal Dimensions</b>	<b>Project 1052</b>	<b>Project 10580</b>	<b>Project 22220</b>
<b>Basic area of operations</b>	<b>Arctic</b>	<b>Yenisei River and shallow Arctic waters</b>	<b>Permanently – Western Arctic incl. Barents, Pechora and Kara Sea, shallow waters of the Yenisei River (up to port of Dudinka) and the Gulf of Ob. Eastern Arctic – in summer-autumn period</b>
<b>Length overall, m</b>	<b>148,0</b>	<b>150,0</b>	<b>173,3</b>
<b>Beam, m</b>	<b>30,0</b>	<b>29,2</b>	<b>34,0</b>
<b>Board height, m</b>	<b>17,2</b>	<b>15,2</b>	<b>15,2</b>
<b>Draught, m</b>	<b>11,00</b>	<b>8,1</b>	<b>10,5</b>
<b>Minimal</b>	<b>-</b>	<b>-</b>	<b>8,55</b>
<b>Water displacement, t</b>	<b>23 460</b>	<b>19 600</b>	<b>33 530</b>
<b>Minimal</b>	<b>-</b>	<b>-</b>	<b>25 540</b>
<b>Quantity and power of turbines, kW</b>	<b>2 * 27 580</b>	<b>2 * 18 400</b>	<b>2 * 33 500</b>
<b>Propulsion, hp</b>	<b>75 000</b>	<b>50 000</b>	<b>91 000</b>
<b>Ice-free water speed, knots</b>	<b>20,8</b>	<b>20,2</b>	<b>~ 22</b>
<b>Ice passability, m</b>	<b>2,25</b>	<b>1,95</b>	<b>2,8 – 2,9</b>
<b>Shaft power to water displacement</b>	<b>2,09</b>	<b>1,66</b>	<b>1,79</b>
<b>Crew quantity</b>	<b>107</b>	<b>91</b>	<b>75</b>

**Thank you for your attention!**

